WLPCS
Geometry

TOPIC 1: Midpoint and Distance

1. A quadrilateral has vertices P(0,2), Q(2,-1), R(8,3), and S(6,6).

   a. What can you determine about the opposite sides of PQRS? Show work to support your answer.

   b. What can you determine about the diagonals of PQRS? Show work to support your answer.

   c. What type of quadrilateral is PQRS?

   d. Graph PQRS on a coordinate plane. Find the midpoint of each side length. Connect adjacent midpoints. What figure did you create? How do you know?

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Geometry

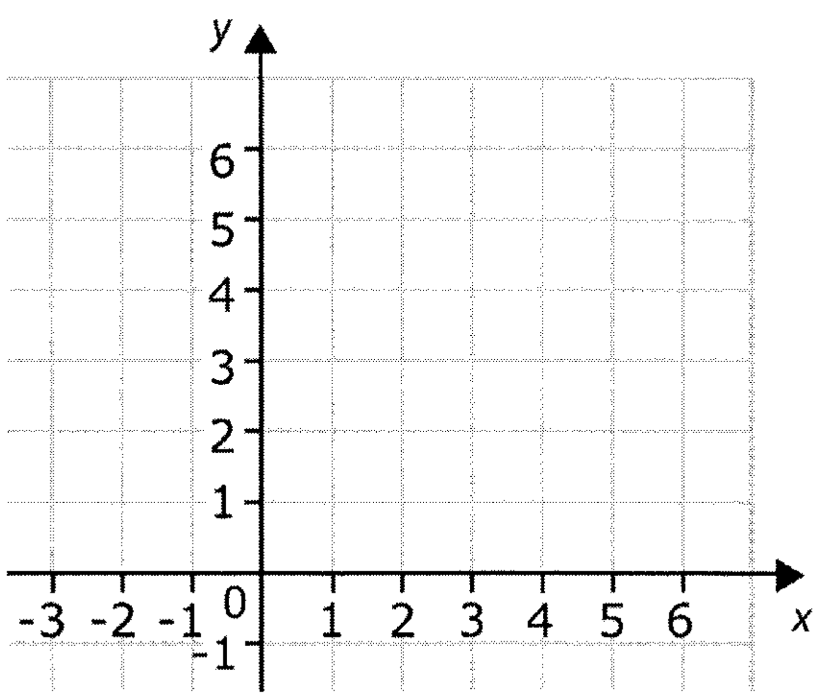
TOPIC 2: Midsegment Theorem

2. Draw a triangle on the coordinate plane and create one of its midsegments.

    a. Verify that the midsegment is parallel to the third side of the triangle (slope).

    b. Verify that the midsegment is half the length of the third side (distance).

    c. Verify that the two triangles are similar.



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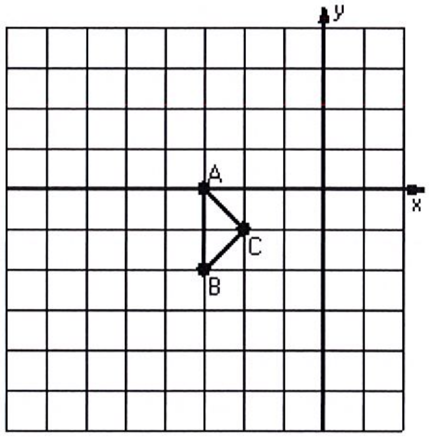
Geometry

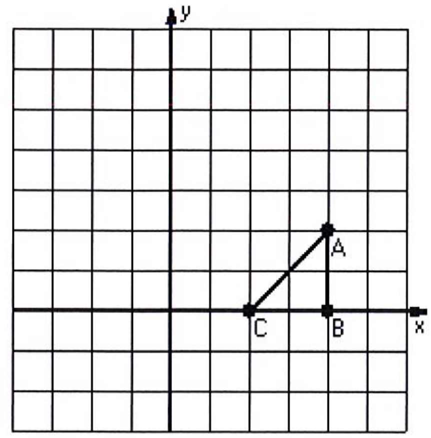
TOPIC 3: Dilations

Directions: Perform the dilation according to the scale factor and center of dilation.

3) Dilation scale = 4, center D(-3,-1)



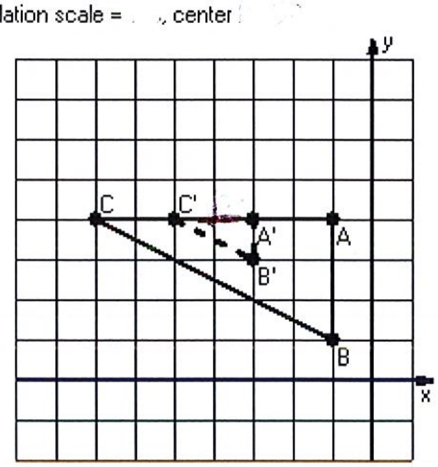
4) Dilation scale = 1/2, center D(-2,2)



* Choose one problem (#3 or 4) and verify the scale factor by finding the length of two corresponding sides.

Directions: Find the center of dilation and scale factor for the given image and pre-image.

5) Dilation scale = , center



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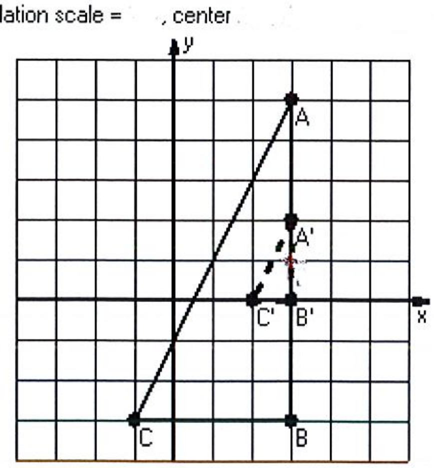

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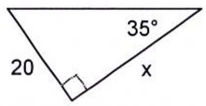
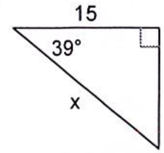
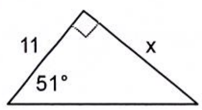
Geometry

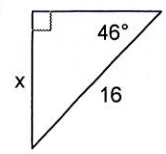
TOPIC 4: Introduction to Trigonometry

Find the missing side. Round to the nearest tenth.

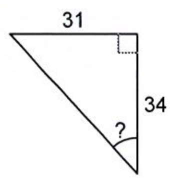
1)


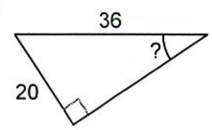
2)


3)


4)


Find the measure of the indicated angle to the nearest degree.

5)


6)


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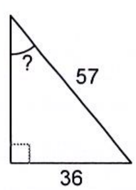

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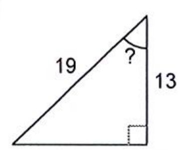
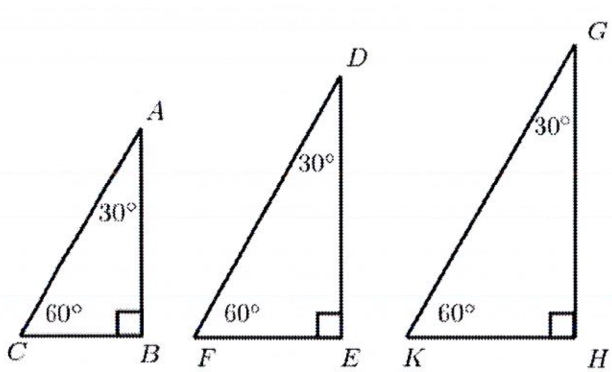


9. Are the three triangles below similar? How do you know? Why is the sine, cosine, or tangent of 30° the same for each triangle even though they appear to be different sizes?



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Geometry

TOPIC 1: Midpoint and Distance

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$midpoint = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

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Geometry

TOPIC 2: Midsegment Theorem

To create a midsegment:

1. Find and mark the midpoint of one side of the triangle.
2. Find and mark the midpoint of a second side of the triangle.
3. Connect the two midpoints with a line segment (the midsegment).
4. The midsegment is both parallel to and half the length of the third side.
5. The two triangles created are similar. You can prove they are similar by SSS, SAS, or AA.
    a. SSS: Each set of corresponding sides are in a ratio of 1:2.
    b. SAS: Each set of corresponding sides are in a ratio of 1:2 and the two triangles share an angle.
    c. AA: The triangles share an angle and the parallel sides and transversals create pairs of corresponding angles, which are congruent.

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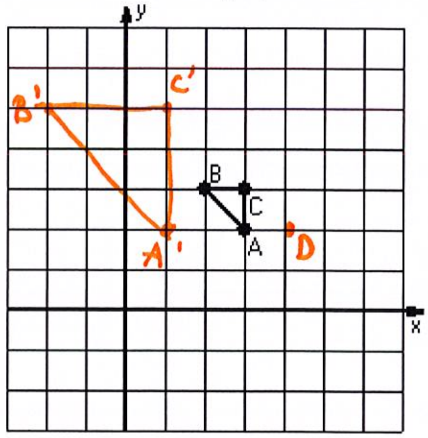
Geometry

TOPIC 3: Dilations

Dilation scale = 3, center D(4,2)



Remember that dilations:

- create similar figures
- have corresponding sides that are parallel
- have corresponding sides that are proportional (in equal ratios)

Also remember that:

- corresponding points and the center of dilation are collinear

TOPIC 3: Dilations

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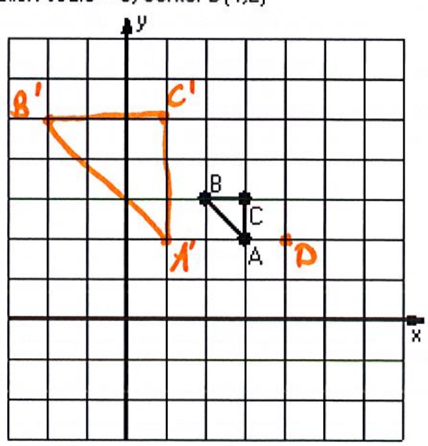

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Geometry

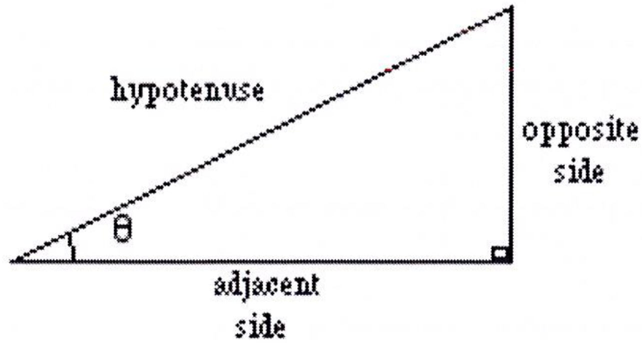
TOPIC 4: Introduction to Trigonometry

The three trigonometric ratios are below:

$$\text{SOH} \quad \sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{CAH} \quad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{TOA} \quad \tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$



The sine, cosine or tangent of θ is the same for all right triangles. Any right triangle with angle θ is similar to any another right triangle with angle θ. Because they are similar, their sides are proportional; therefore, the ratio of their opposite side to hypotenuse, adjacent side to hypotenuse, and opposite side to adjacent side will be equal.

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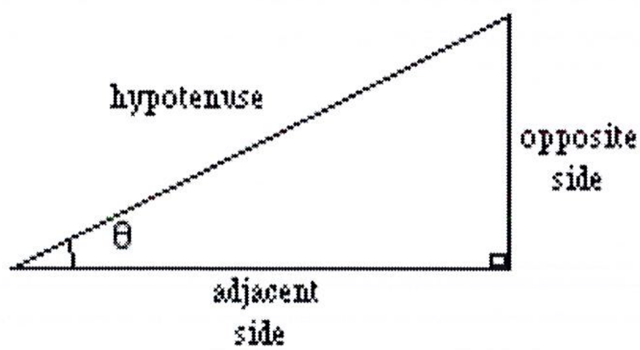

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ANSWER KEY

TOPIC 1: Midpoint and Distance

1. A quadrilateral has vertices P(0,2), Q(2,-1), R(8,3), and S(6,6).

   a. What can you determine about the opposite sides of PQRS? Show work to support your answer.

   $PQ = \sqrt{2^2+3^2} = \sqrt{4+9} = \sqrt{13}$

   $QR = \sqrt{52} = 2\sqrt{13}$

   $RS = \sqrt{13}$

   $PS = \sqrt{52} = 2\sqrt{13}$

   Opposite sides are = in measure.

   b. What can you determine about the diagonals of PQRS? Show work to support your answer.

   $QS = \sqrt{4^2+7^2} = \sqrt{16+49} = \sqrt{65}$

   $PR = \sqrt{65}$

   Diagonals are = in measure.

   c. What type of quadrilateral is PQRS?

   Rectangle

   d. Graph PQRS on a coordinate plane. Find the midpoint of each side length. Connect adjacent midpoints. What figure did you create? How do you know?

   Parallelogram!

   Opposite sides are parallel (slopes are the same)

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Geometry

ANSWER KEY

TOPIC 2: Midsegment Theorem

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   a. Verify that the midsegment is parallel to the third side of the triangle (slope).

   slope of CB $= \frac{2}{4} = \boxed{\frac{1}{2}}$ ✓

   slope of $\overline{ED} = \boxed{\frac{1}{2}}$

   b. Verify that the midsegment is half the length of the third side (distance).

   $CB = \sqrt{20}$ OR $2\sqrt{5}$

   $ED = \sqrt{5}$

   $CB = 2(ED)$ OR $ED = \frac{1}{2}(CB)$

   c. Verify that the two triangles are similar.

SSS

$\frac{AD}{AB} = \frac{AE}{AC} = \frac{ED}{CB} = \frac{1}{2}$

SAS

$\frac{AD}{AB} = \frac{AE}{AC} = \frac{1}{2}$

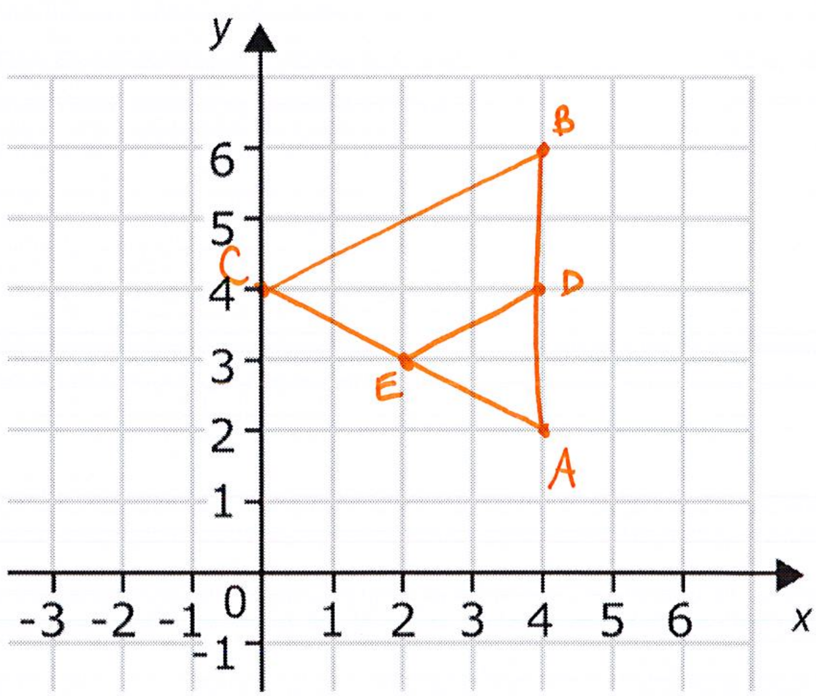
$\angle A \cong \angle A$ by Reflexive Prop.

AA

$\angle BCE \cong \angle DEA$

$\angle ABC \cong \angle ADE$

b/c $\overline{DE} \parallel \overline{BC}$ and corresponding angles are congruent



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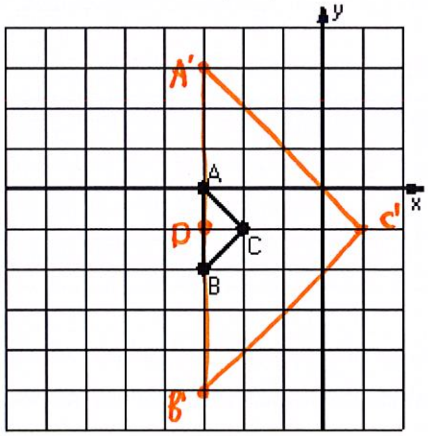

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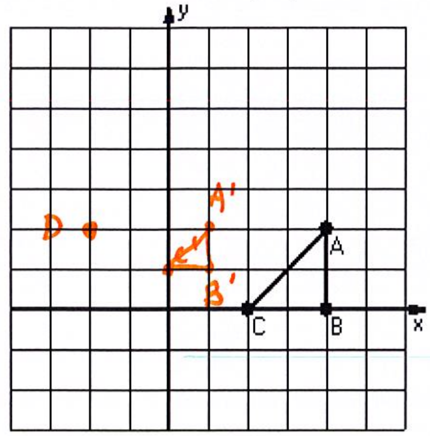


* Choose one problem (#3 or 4) and verify the scale factor by finding the length of two corresponding sides.

$AB = 2$ $\frac{8}{2} = 4$ ✓

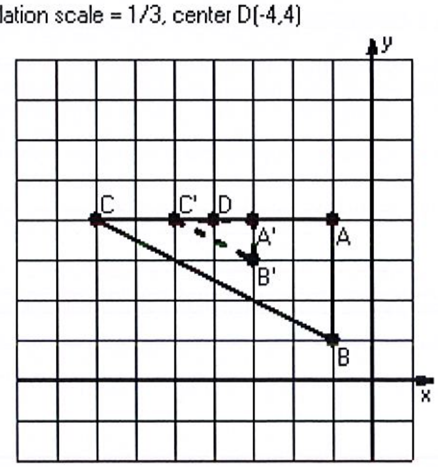
$A'B' = 8$

$AB = 2$ $\frac{1}{2}$ ✓

$A'B' = 1$

Directions: Find the center of dilation and scale factor for the given image and pre-image.

5) Dilation scale = 1/3, center D(-4,4)



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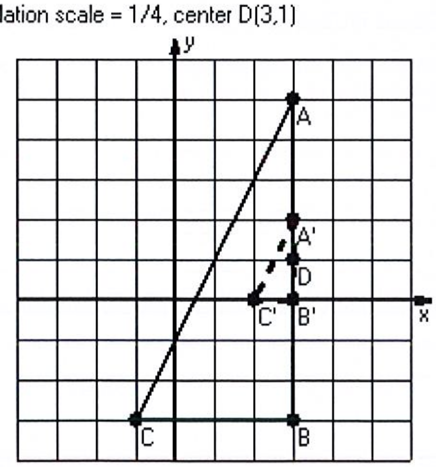

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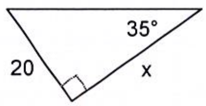
Geometry

ANSWER KEY

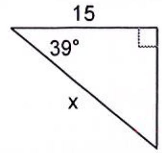
TOPIC 4: Introduction to Trigonometry

Find the missing side. Round to the nearest tenth.

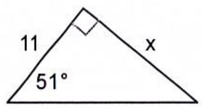
1) 

$\tan 35° = \frac{20}{x}$

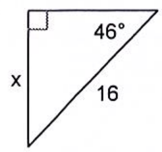
$x = 28.6$

2) 

$x = 19.3$

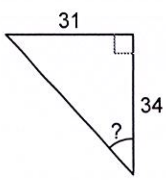
3) 

$x = 13.6$

4) 

$x = 11.5$

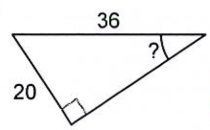
Find the measure of the indicated angle to the nearest degree.

5) 

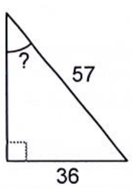
$\tan ? = \frac{31}{34}$

42°

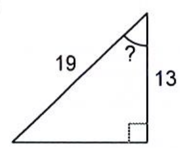
(use inverse tan... $\tan^{-1}$... to solve)

6) 

34°

7) 

39°

8) 

47°

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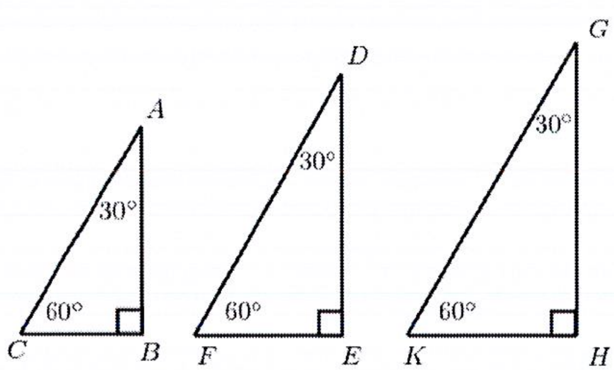

- Yes, by AA
- B/c they are similar, their corresponding sides are proportional. sin $\left(\frac{opp}{hyp}\right)$, cos $\left(\frac{adj}{hyp}\right)$, tan $\left(\frac{opp}{adj}\right)$ will be equal ratios for similar triangles.